This Examiner's Amendment is in response to Applicant's amendments filed July 7, 2009 and an interview held with Mr. Charles Miller on July 24, 2009. Claims 1, 11 17-20, 24, 30, 34, 44, 58 and 61 are amended herein and claims 2, 12, 16, 25, 29, 35, 45, 48-53 and 55 are canceled. Claims 1, 3-11, 13-15, 17-24, 26-28, 30-34, 36-44, 46-47, 54 and 56-61 are currently pending and allowed below.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Charles Miller (Reg. No. 43,805) on July 24, 2009.

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in this application.

1. (Currently Amended) An apparatus that determines allocations in a business operation to maximize profit on a computer system, comprising:

a memory; and

a processor that accesses the memory to retrieve computer-executable instructions to perform:

collecting profit data for a plurality of classes in the business operation, each class including an allocation having a cost function, the allocations being constrained by a total floor area, each class corresponding to a department of the business operation, and each allocation belonging to the group consisting of physical allocations and economic allocations;

determining profit functions for the allocations from the profit data by:

determining demand distributions for the allocations from the profit data;

determining a spatial allotment for each said department; and

determining each profit function from a corresponding demand distribution for the spatial allotment of each said department;

formulating a Multiple Choice Knapsack Problem to maximize profit based one the profit functions, the cost functions, and a cost constraint;

running the Multiple Choice Knapsack Problem to determine values for the allocations, by utilizing a solution vector holding allocation values, and a recursive function that rewrites allocation values into the solution vector by recursively running for possible allocations from 0 up to a predetermined maximum allocation for each class, wherein the recursive function improves local caching performance by ~~evaluates~~ evaluating possible allocations for each class in a sequentially increasing order ~~to improve local caching performance~~; and

selecting the allocation values in the solution vector that maximize profit.

2. (Cancelled)

3. (Previously Presented) The apparatus according to claim 1, wherein each demand distribution includes a Poisson model.

4. (Previously Presented) The apparatus according to claim 1, wherein each demand distribution includes a Markov model.

5. (Previously Presented) The apparatus according to claim 1, wherein each demand distribution includes a normal distribution model.

6. (Previously Presented) The apparatus according to claim 1, wherein the allocations include spatial allotments.

7. (Previously Presented) The apparatus according to claim 1, wherein the allocations include monetary allotments.

8. (Previously Presented) The apparatus according to claim 1, wherein the cost constraint is a greater-than-or-equal-to inequality constraint.

9. (Previously Presented) The apparatus according to claim 1, wherein the cost constraint is an equality constraint.

10. (Previously Presented) The apparatus according to claim 1, wherein the cost constraint is a less-than-or-equal-to inequality constraint.

11. (Currently Amended) An apparatus that determines physical allocations in a business operation to maximize profit on a computer system, comprising:

a memory; and

a processor that accesses the memory to retrieve computer-executable instructions to perform:

collecting profit data for a plurality of classes in the business operation, each class including a ~~physical~~ allocation having a cost function, the ~~physical~~ allocations being constrained by a total floor area, each class corresponding to a department of the business operation, and each allocation belonging to the group consisting of physical allocations that include spatial allotments for the classes and economic allocations;

determining profit functions for the physical allocations from the profit data by:

determining demand distributions for the allocations from the profit data;

determining a spatial allotment for each said department; and

determining each profit function from a corresponding demand distribution for the spatial allotment of each said department;

formulating a Multiple-Choice Knapsack Problem to maximize profit based on the profit functions, the cost functions, and a cost constraint; and

running the Multiple Choice Knapsack Problem to determine values for the physical allocations, by utilizing a solution vector holding physical allocation values, and a recursive function that rewrites values into the solution vector by recursively running for possible physical allocations from 0 up to a predetermined maximum physical allocation for each class, wherein the recursive function improves local caching performance by ~~evaluates~~ evaluating possible physical allocations for each class in a sequentially increasing order~~ to improve local caching performance~~; and

selecting the physical allocation values in the solution vector that maximize profit.

12. (Cancelled)

13. (Previously Presented) The apparatus according to claim 11, wherein each demand distribution includes a Poisson model.

14. (Previously Presented)The apparatus according to claim 11, wherein each demand distribution includes a Markov model.

15. (Previously Presented)The apparatus according to claim 11, wherein each demand distribution includes a normal distribution model.

16. (Canceled)

17. (Currently Amended) The apparatus according to claim 11~~16~~, wherein the spatial allotments include widths for the classes and the cost constraint is a width constraint.

18. (Currently Amended) The apparatus according to claim 11~~16~~, wherein the spatial allotments include advertising spaces for the classes and the cost constraint is an advertising space constraint.

19. (Currently Amended) The apparatus according to claim 11~~16~~, wherein the spatial allotments include catalog spaces for the classes and the cost constraint is a catalog space constraint.

20. (Currently Amended) The apparatus according to claim 11~~16~~, wherein the spatial allotments include floor spaces for the classes and the cost constraint is a floor space constraint.

21. (Previously Presented) The apparatus according to claim 11, wherein the cost constraint is a greater-than-or-equal-to inequality constraint.

22. (Previously Presented) The apparatus according to claim 11, wherein the cost constraint is an equality constraint.

23. (Previously Presented) The apparatus according to claim 11, wherein the cost constraint is a less-than-or-equal-to inequality constraint.

24. (Currently Amended) An apparatus that determines economic allocations in a business operation to maximize profit on a computer system, comprising:

a memory; and

a processor that accesses the memory to retrieve computer-executable instructions to perform:

collecting profit data for a plurality of classes in the business operation, each class including an ~~economic~~ allocation having a cost function, the ~~economic~~ allocations being constrained by a total floor area, each class corresponding to a department of the business operation, and each allocation belonging to the group consisting of physical allocations and economic allocations that include monetary allotments for the classes;

determining profit functions for the economic allocations from the profit data by:

determining demand distributions for the allocations from the profit data;

determining a spatial allotment for each said department; and

determining each profit function from a corresponding demand distribution for the spatial allotment of each said department;

formulating a Multiple Choice Knapsack Problem to maximize profit based on the profit functions, the cost functions, and a cost constraint; and

running the Multiple Choice Knapsack Problem to determine values for the economic allocations, by utilizing a solution vector holding economic allocation values, and a recursive function that rewrites values into the solution vector by recursively running for possible economic allocations from 0 up to a predetermined maximum economic allocation for each class, wherein the recursive function <u>improves local caching performance by</u> ~~evaluates~~ <u>evaluating</u> possible economic allocations for each class in a sequentially increasing order ~~to improve local caching performance~~; and

selecting the economic allocation values in the solution vector that maximize profit.

25. (Cancelled)

26. (Previously Presented) The apparatus according to claim 24, wherein each demand distribution includes a Poisson model.

27. (Previously Presented) The apparatus according to claim 24, wherein each demand distribution includes a Markov model.

28. (Previously Presented) The apparatus according to claim 24, wherein each demand distribution includes a normal distribution model.

29. (Canceled)

30. (Currently Amended) The apparatus according to claim <u>24</u>~~29~~, wherein the cost constraint is a monetary constraint.

31. (Previously Presented) The apparatus according to claim 24, wherein the cost constraint is a greater-than-or-equal-to inequality constraint.

32. (Previously Presented) The apparatus according to claim 24, wherein the cost constraint is an equality constraint.

33. (Previously Presented) The apparatus according to claim 24, wherein the cost constraint is a less-than-or-equal-to inequality constraint.

34. (Currently Amended) A system for determining allocations in a business operation to maximize profit, comprising:

a data unit, the data unit having a memory that includes profit data for a plurality of classes in the business operation, each class including an allocation having a cost function that is stored in the memory, and the memory also including a cost constraint, the allocations being constrained by a total floor area, each class corresponding to a department of the business operation, and each allocation belonging to the group consisting of physical allocations and economic allocations;

a profit-model unit, the profit-model unit being connected to the data unit, and the profit-model unit including executable instructions for determining profit functions for the allocations from the profit data, wherein determining the profit functions includes:

determining demand distributions for the allocations from the profit data;

determining a spatial allotment for each said department; and

determining each profit function from a corresponding demand distribution for the spatial allotment of each said department; and

an optimization-engine-unit, the optimization-engine unit being connected to the data unit and the profit-model unit, the optimization-engine unit including executable instructions for formulating a Multiple Choice Knapsack Problem to maximize profit

based on the profit functions, the cost functions, and the cost constraint, for creating a solution vector holding allocation values, and for running the Multiple Choice Knapsack Problem to determine values for the allocations, by utilizing a recursive function that rewrites values into the solution vector-by recursively running for possible physical from 0 up to a predetermined maximum allocation for each class, wherein the recursive function improves local caching performance by ~~evaluates~~ evaluating possible allocations for each class in a sequentially increasing order~~-to improve local caching performance~~; and

wherein the optimization-engine unit including executable instructions for selecting the allocation values in the solution vector that maximize profit.

35. (Cancelled)

36. (Previously Presented) A system according to claim 34, wherein each demand distribution includes a Poisson model.

37. (Previously Presented) A system according to claim 34, wherein each demand distribution includes a Markov model.

38. (Previously Presented) A system according to claim 34, wherein each demand distribution includes a normal distribution model.

39. (Previously Presented) A system according to claim 34, wherein the allocations include spatial allocations.

40. (Previously Presented) A system according to claim 34, wherein the allocations include economic allocations.

41. (Previously Presented) A system according to claim 34, wherein the cost constraint is a greater-than-or-equal-to inequality constraint.

42. (Previously Presented) A system according to claim 34, wherein the cost constraint is an equality constraint.

43. (Previously Presented) A system according to claim 34, wherein the cost constraint is a less-than-or-equal-to inequality constraint.

44. (Currently Amended) Computer-readable media tangibly embodying a program for determining allocations in a business operation to maximize profit, the program including executable instructions for:

collecting profit data for a plurality of classes in the business operation, each class including an allocation having a cost function, the allocations being constrained by a total floor area, each class corresponding to a department of the business operation, and each allocation belonging to the group consisting of physical allocations and economic allocations;

determining profit functions for the allocations from the profit data by:

determining demand distributions for the allocations from the profit data;

determining a spatial allotment for each said department; and

determining each profit function from a corresponding demand distribution for the spatial allotment of each said department;

formulating a Multiple Choice Knapsack Problem to maximize profit based on from the profit functions, the cost functions, and a cost constraint; and

solving the Multiple Choice Knapsack Problem to determine values for the allocations, by utilizing a solution vector holding allocation values, and a recursive function that rewrites values into the solution vector by recursively running for possible allocations from 0 up to a predetermined maximum allocation for each class, wherein the recursive function improves local caching performance by ~~evaluates~~ evaluating possible allocations for each class in a sequentially increasing order ~~to improve local caching performance~~; and

selecting the allocation values in the solution vector that maximize profit.

45. (Cancelled)

46. (Previously Presented) Computer-readable media as claimed in claim 44, wherein each demand distribution includes a Poisson model.

47. (Previously Presented) Computer-readable media as claimed in claim 44, wherein each demand distribution includes a Markov model.

48-53 (Cancelled)

54. (Previously Presented) The apparatus of claim 1, wherein determining demand distributions for the allocations from the profit data comprises:

modeling the demand distributions with corresponding probabilistic functions.

55. (Cancelled)

56. (Previously Presented) The apparatus of claim 1, wherein a size of the solution vector is substantially equal to a value of the cost constraint.

57. (Previously Presented) The apparatus of claim 1, further including computer-executable instructions to perform:

before solving the Multiple Choice Knapsack Problem, ordering the plurality of classes by cost function.

58. (Currently Amended) The apparatus of claim 1, further including computer-executable instructions to perform:

before solving the Multiple Choice Knapsack Problem, removing a first item from a class ~~if~~ when the item is dominated by a second item in the class, wherein the second item dominates the first item ~~if~~ when the first and second item have substantially similar cost functions, but the second item has a higher profit function.

59. (Previously Presented) The apparatus of claim 24, wherein a size of the solution vector is substantially equal to a value of the cost constraint.

60. (Previously Presented) The apparatus of claim 24, further including computer-executable instructions to perform:

before solving the Multiple Choice Knapsack Problem, ordering the plurality of classes by cost function.

61. (Currently Amended) The apparatus of claim 24, further including computer-executable instructions to perform:

before solving the Multiple Choice Knapsack Problem, removing a first item from a class ~~if~~ when the item is dominated by a second item in the class, wherein the second item dominates the first item ~~if~~ when the first and second item have substantially similar cost functions, but the second item has a higher profit function.

ALLOWANCE

The following is an Allowance in response to the Amendment submitted on July 7, 2009 and an interview held with Mr. Charles Miller on August 24, 2009. Claims 1, 3-11, 13-15, 17-24, 26-28, 30-34, 36-44, 46-47, 54 and 56-61 are currently pending and allowed below.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance.

The present invention is directed to a system and method for profitably allocate shelf space allocations based on economic, spatial, demand, cost and profit factors (functions/data) utilizing a recursive Multiple Choice Knapsack Problem.

The closest prior art Zufryden, A Dynamic Programming Approach for Product Selection and Supermarket Shelf- Space Allocation (1986), Bean et al., A Hybrid Algorithm for the Multiple Choice Knapsack Problem (1990), Pisinger, A Minimal Algorithm for the Multiple-Choice Knapsack Problem (1994) and Johnson, Resource Allocation Models For Retail Planning and Display Space Allocation, and Optimal Allocation of Catalog Advertising Space (1982) fail to teach or suggest either singularly or in combination a apparatus/system that maximizes business operation allocations comprising: collecting profit data for a plurality of classes in the business operation, each class including an allocation having a cost function, the allocations being

constrained by a total floor area, each class corresponding to a department of the business operation, and each allocation belonging to the group consisting of physical allocations and economic allocations; determining profit functions for the allocations from the profit data by: determining demand distributions for the allocations from the profit data; determining a spatial allotment for each said department; and determining each profit function from a corresponding demand distribution for the spatial allotment of each said department; formulating a Multiple Choice Knapsack Problem to maximize profit based one the profit functions, the cost functions, and a cost constraint; running the Multiple Choice Knapsack Problem to determine values for the allocations, by utilizing a solution vector holding allocation values, and a recursive function that rewrites allocation values into the solution vector by recursively running for possible allocations from 0 up to a predetermined maximum allocation for each class, wherein the recursive function improves local caching performance by evaluates evaluating possible allocations for each class in a sequentially increasing order to improve local caching performance; and selecting the allocation values in the solution vector that maximize profit as recited in independent Claims 1, 11, 24, 34 and 44.

Further Applicant's arguments, see Paragraph 2, Page 4, with respect to Pisinger have been fully considered and are persuasive.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

CONCLUSION

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Schreiber, U.S. Patent No. 6,952,821, teach a system and method for optimizing computer memory allocations by solving the well known knapsack problem.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SCOTT L. JARRETT whose telephone number is (571)272-7033. The examiner can normally be reached on Monday-Friday, 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley Bayat can be reached on (571) 272-6704. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Scott L Jarrett/
Primary Examiner, Art Unit 3624